EXPANSION OF THE INCIDENT COMMAND SYSTEM IN A "MAYDAY" SITUATION

EXECUTIVE ANALYSIS OF FIRE SERVICE OPERATIONS IN EMERGENCY MANAGEMENT

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ABSTRACT

Rapid Intervention Teams are the focus of many fire department training sessions. Current training programs do not provide the specific information to the incident commander on the expansion of the incident command system. When the "Mayday" call is broadcast on the fireground, the incident commander is not properly trained for the expansion of the incident command system. There are many examples of how we have succeeded and failed in handling these situations.

The problem this research project addressed was the fact that the current training programs and publications on the deployment of rapid intervention teams do not address the training needs of the incident commander. The purpose of this research was to assess the command structure and utilize hands-on RIT training to create a training guideline that was appropriate for a mayday situation on the fireground. A literature review and hands-on training sessions were the primary procedures utilized in the study that used evaluative and action research to answer the following questions:

1. What recommendations are made by NIOSH reports of firefighter fatalities during structural fire operations concerning the function of ICS?

2. How are RIT's deployed and managed under the current training programs and existing systems?

3. What is the average number of firefighters used to rescue a downed or trapped firefighter?

4. What is the most effective way to expand the ICS to manage multiple RIT's deployed?

The results of the information gathered created a training guideline. It recommended that RIT training focus on the incident commander and continue to document on RIT deployment. Those who are the incident commander, or who may be in the future, must actively participate in the training.

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INTRODUCTION

The use of the incident command system (ICS) is a normal function for the Pleasant View Volunteer Fire Department and is a key to the successful outcome of incident operations. The daily implementation of an ICS is a "standard response to a standard condition" (Brunacini, 2002, p. 174). However, the deployment of a rapid intervention team (RIT) is not a typical standard condition. Thus, the question becomes, how does the incident commander (IC) handle the call for help from firefighters operating on the fireground, typically referred to as a "Mayday"?

The Pleasant View Volunteer Fire Department and its neighboring fire department, the Ashland City Fire Department, have an automatic aid agreement for the purpose of staffing the fireground with sufficient personnel to handle the incident and prepare for the unexpected "Mayday." When firefighters get into trouble inside the hazardous atmosphere of a burning building adequate amounts of properly trained personnel are key to a successful outcome. Norman (1998) says it best, "if you don't have the personnel to effect the rescue, the trapped firefighter will die. It's as simple as that" (p. 299).

The deployment of a RIT is a reactionary process to an unwanted condition. This deployment of personnel is a task level assignment in the ICS. Focus must change to the prevention of such unwanted conditions and to training not only the firefighters for the task but for the decision makers, the IC, at the strategy level. Coleman and Lasky (Jan. 2000) in their *Fire Engineering* article state that "fortunately, in the past couple of years, it appears that more and more fire departments across the nation have been training their firefighters in the techniques necessary to rescue firefighters" (p. 51).

The Pleasant View Volunteer Fire Department and Ashland City Fire Department have conducted training since 1997 that taught personnel how to save themselves. In 1999, Tim Sendelbach with TES2 Training conducted RIT Deployment training for all personnel. It was observed that this was great training for the firefighters in tactical and task level operations but that the IC was still attempting to make decisions on the "standard conditions" they used in handling daily operations.

Coleman and Lasky (2000) noted the lack of focus on the IC by stating "we found that very little emphasis was being placed on training our personnel to manage and handle the fireground emergency itself" (p. 51).

Therefore, the problem is that current training programs and publications on the deployment of RIT do not address the training needs of the IC or expansion of the IMS. When the "Mayday" call is broadcast on the fireground, the IC is not properly trained for the expansion of the ICS.

The general knowledge of the officers who typically serve as the IC does not guarantee they will know what to do in a "Mayday" scenario. Can the IC perform command duties of the RIT team in addition to those already under his/her responsibility? Would a training guideline and hands-on RIT training for the IC improve the likelihood of a favorable outcome?

The purpose of this applied research project is to create a training guideline that expands the incident command system with specific instructions for the incident commander. Evaluative and action research methods were utilized to answer the following questions:

1. What recommendations are made by National Institute for Occupational Safety and Health (NIOSH) reports of firefighter fatalities during structural fire operations concerning the function of ICS?

2. How are RIT's deployed and managed under the current training programs and existing systems?

3. What is the average number of firefighters used to rescue a downed or trapped firefighter?

4. What is the most effective way to expand the ICS to manage multiple RIT's deployed?

Fire department data exists that allows us to learn from "Mayday" situations that have occurred in the fire service. As a result of the documentation of firefighter fatalities, information is available that can guide the development of a training guideline for incident command in a "Mayday" situation.

What happens after this call for "Mayday" will be the focus of this applied research project. By researching the data in NIOSH reports, the reality of the mayday situation becomes clear. As part of the research for this applied research project information was gathered regarding how the fire departments are staffed to handle RIT situations and whether they are properly trained. Also, observations were made at three hands-on RIT training sessions, and the emerging issue remained clear. A training guideline is needed for the IC.

BACKGROUND AND SIGNIFICANCE

The Pleasant View Volunteer Fire Department has been proactive in the pursuit of training and operations that improve firefighter safety and quality service delivery to our citizens. Political and personal barriers have been broken down since 1997, which has improved relations between the Pleasant View Volunteer Fire Department and the Ashland City Fire Department. The results of this relationship have increased training opportunities and improved response capabilities.

The Pleasant View Volunteer Fire Department has been blessed that no firefighter has been killed in the line of duty while fighting a structure fire in its history. To view this fact as anything other than a blessing and to only look at the operations of the Pleasant View Volunteer Fire Department would be continuing to count on faith for the future. The statistics in Pleasant View show an increase in the number of structure fires, which are contrary to those of the nation. Pleasant View Volunteer Fire Department must not relax and not worry about the deployment of RIT in a "Mayday" situation.

"In spite of the declining rate of structure fires and the improvements in personal protective equipment, Self-contained Breathing Apparatus (SCBA), training, communications, and incident command, the numbers of firefighter fatalities in structure fires has not comparably decreased" (Kolomay & Hoff, 2003, p. 3). This statement is partly true for Pleasant View Volunteer Fire Department, with the exception of the number of incidents. The table below shows the number of structure fires responded to since 1993.

Table 1
Structure Fires In Pleasant View

Year	# of Fires	Year	# of Fires
1993	12	1998	61
1994	10	1999	44
1995	20	2000	24
1996	18	2001	37
1997	28	2002	34

A main factor in the increased number of calls was the closing of a fire department in the county and the signing of an automatic aid agreement with a neighboring department. Therefore, when reviewing the reports the United States Fire Administration (USFA) (2001) that state "…while the total number of firefighter fatalities have been trending downward over the past 20 years, the number of firefighter deaths per fire incident may have risen" (p. 5). A study conducted by Tridata Corporation for the USFA (2002) showed a 15 percent decline in the number of fire incidents over the study period. "Statistics show that although fewer fires are occurring and firefighter deaths are down, firefighter fatalities as compared with the number of incidents are actually on the rise" (Dunn, 1999, p. 256). The results of these statistics display the need to focus on the improvements in equipment and especially training for the Pleasant View Volunteer Fire Department because the number of fire incidents have risen.

Improvements have been made in the department in equipment. All personnel are issued full personal protective equipment including PBI gear, SCBA's have been upgraded to Scott Fifty™ with integrated PASS devices, and all personnel are trained annually at a minimum of basic fire operations including self survival and RIT deployment. Therefore, great vulnerability lies in communications and the IMS. Currently, fire department members do not have portable radios because the department operates on low band and no higher band frequencies have been granted to the department by the state controller of the Federal Communication Commission (FCC). A strong plea to county officials to correct this problem has been made and the situation should change soon. The other area that needs improvement is the ICS. Training the IC for the strategic level decisions that have to be made on the fireground has not been a major role of training. "Successful incident operations require the application of an effective overall

management system, and the skills of a strong IC starting at the very beginning of the event" (Brunacini, 2002, p. 32).

The Pleasant View Volunteer Fire Department has not specifically focused its training on officers utilizing the ICS to manage "Mayday" incidents. NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program,* 5.1.11 requires "all members who are likely to be involved in emergency operations shall be trained in the incident management and accountability system used by the department" (p. 13). The Pleasant View Volunteer Fire Department complies with this section. However, when reviewed in context with NFPA 1500, 5.2.9, "The fire department shall adopt or develop training and education curriculums that meet the minimum qualifications standard covering the members assigned function" (p. 13). This is where the Pleasant View Volunteer Fire Department falls short. NFPA 1021, *Standard for Fire Officers Professional Qualifications,* 2-6.3 requires all officers to have "…the ability to implement an IMS, to communicate verbally, and to supervise and account for assigned personnel under emergency conditions" (p. 7). Furthermore, NFPA 1500, 5.3.4 states that "…the FD shall provide an annual skills check to verify minimum professional qualifications of its members" (p. 13). NFPA 1500, 8.1.4 states "…the incident management system (IMS) shall be applied to drills, exercises, and other situations that involve hazards similar to those encountered at actual emergency incidents and to simulated incidents that are conducted for training and familiarization purposes" (p. 21). However, NFPA 1561, *Standard on Emergency Services Incident Management System*, 4.6.4 states "…the Emergency Services Organization (ESO) shall define training and experience requirements for supervision" (p. 7).

The creation of a training guideline will provide training to personnel who may be in a position to be the IC in the unwanted "Mayday" scenario. The author has conducted RIT Deployment training locally and across the country to observe that the IC is not effective in the expansion of the ICS when multiple RIT's are deployed.

The IC must be properly trained to expand the ICS should the need arise. NFPA 1561, 4.5.4 states, "…the system shall provide for a routine process of escalation as additional resources are utilized" (p. 7). Officers who have been properly trained on the use of the ICS expand the system well for disasters and daily events because of experience and training. The lack of experience and training for managing the "Mayday" scene leaves the IC in need of additional training.

This applied research project is directly related to the National Fire Academy's *Executive Analysis of Fire Service Operations in Emergency Management* course because managing table-top disasters has been a part of officer ICS training for years. However, we need to expand this to scenario based training and specifically, the "Mayday" incident. "Effective emergency management is extremely important to the well-being of our communities. Only through continued training can we hope to improve our responses before, during, and after a large-scale incident occurs in our communities" (National Fire Academy [NFA], 2001, *Executive Analysis of Fire Service Operations in Emergency Management* Student Manual (SM), p. 1-5). A trapped or lost firefighter would qualify as a large-scale incident.

"Many fire departments have a lost/trapped firefighter standard operating procedure in place, but many do not train the RIT officer on his responsibilities or the IC in how to manage the fireground emergency" (Coleman & Lasky, 2000, p. 51).

This applied research project will use the analysis of USFA statistics and NIOSH reports to ensure personnel are aware of the need for improvement. "Virtually every piece and part of the incident management system (IMS) is driven and directed by real, live, human responders so the system is basically about human performance" (Brunacini, 2002, p. 56). The creation of the training guideline will be used to improve the human performance of officers with the goal of assisting the USFA in achieving its operational objective of reducing the loss of life from fire of firefighters.

LITERATURE REVIEW

The growing popularity and importance of RIT is generating an increased body of knowledge on the subject. Numerous publications have existed on the ICS but those of earlier years do not address the expansion of the system to include RIT. There are also numerous books on decision making in stressful situations, an important factor in the managing of a "Mayday" event. Over the past 10 years, a great deal of periodicals have focused on the subject of RIT. These periodicals tend to deal with the tactical aspects and task level details of RIT deployment while few address the strategy level. The IC is popular in the periodicals, however, few address the needed training or the expansion of ICS.

Routley, Bush, & Stern (1996) recommended the best place to start is by looking at the "…circumstances that lead to these unwelcomed occurrences" (p. 50). NIOSH reports have provided in-depth investigations on firefighter deaths since 1998. The USFA provides vital statistics on firefighter deaths and injuries. These reports and statistics provide a great deal of information that can be utilized to prevent such events in the future.

Applied research papers from the Executive Fire Officer Program of the National Fire Academy are limited on the topic of RIT. The papers that are available utilize some common sources, but most generate standard operating procedures (SOP's). None of the papers researched by the author generated a training guideline with focus on the role of the IC.

The abundant information available on RIT, ICS, and decision making have contributed greatly to this applied research paper. Combining the body of knowledge from the three disciplines allows a new training guideline to emerge that focuses on the decisions of the IC of a "Mayday" event.

The contribution of current guidelines, SOP's and training programs from 19 fire departments significantly contributed to this applied research paper. The lack of focus on training IC's makes this applied research paper significant, especially since the training guideline will enhance RIT programs and ICS that already exist.

The research of available information provided a guide that the IC should recall during the unfortunate "Mayday" event. The IC faces many decisions on the fireground.

Klein (1999) calls it high stakes decisions and reports the following:

> In 1985, I did my first study of how firefighters make life and death decisions under extreme time pressure. The research of naturalistic decision-making--that is, the study of how people use their experience to make decisions in field settings has expanded. However, the fireground commanders seemed to be making effective decisions (Klein, 1999, p.1-2).

These decisions are typically made under stress, and stress on the IC and all personnel increase during a "Mayday" event. "There is no argument that the lost or trapped firefighters situation is very difficult and extremely stressful" (Coleman & Lasky, 2000, p. 51). This statement is reinforced by Jakubowski & Morton (2001) when they proclaim, "A missing or downed firefighter is among the most difficult, stressful situations that any IC can face" (p. 63). Clark (2001) says that the "Mayday" call is the most frightening "…words that can be heard over the fireground radio" (p. 1).

The review of 30 separate NIOSH reports show that in 23 of the 30 incidents investigated, the IC was directly listed as an improvement fire departments should make to minimize similar incidents. This emphasizes the stress and demand on the IC. Common listing of what the fire department should do to minimize similar occurrences as related to the IC are that the IC conduct a complete size up, evaluate risk versus gain, maintain close accountability of all personnel, maintain the role of the director not act as a laborer, and be identified as the only individual responsible for the overall direction of the incident. All of these recommendations are required by NFPA 1500 and NFPA 1561. The fire department knows that they should implement those recommendations prior to the incidents occurring.

Kolomay & Hoff (2003) recognize the importance of NIOSH stating that in the "…goal of preventing severe injury and death and providing an excellent resource for learning" (p. 2). The role of NIOSH investigations is further emphasized by Jakubowski & Morton (2001) in their attempt to answer the question of "Why Rapid Intervention?" (p. 9). They charge through the review of eight fires that their "…examples of recent fires where the absence of an effective emergency rescue plan may have contributed to firefighters' deaths" (p.10).

"Whenever confronted with hazardous situations, whether conventional or not, the incident commander must take action to counter them" (Dunn, 1999, p. 255). The deployment and management of a RIT is expressed in many methods, and training for the IC varies with each method.

Coleman and Lasky (2000) identified the following:

> There are many good guidelines and practices for managing the mayday. However, you will need to identify your specific needs and available resources to develop your own standard operating procedure or guideline. That information

> will enable you to determine how you will handle an emergency on your fireground from start to finish (p. 51).

The documentation of Coleman & Lasky explained the importance of guidelines. This idea was expanded as Coleman (2001) explained, "Practice this at least four times per year! Practice! If you practice anything, practice managing the mayday!" (p. 59).

Cobb (1998) states, "Factors that contribute to early injuries and deaths are light weight wood-truss construction, energy efficient windows, older buildings, and lack of survival training" (p. 52). These are all areas to focus training on. Sendelbach (2001) cites a start to finish concept for managing the mayday (p. 11-17). He further states, "the safe and effective management of a mayday incident is dependent upon a structured, predictable fireground based on firm rules of engagement" (p.13).

Following the Bret Tarver incident in Phoenix on March 14, 2001, an extensive report was written to document the case and lessons learned (Tobin & Kreis, 2002). Kreis (2003) produced an article following the report that states "…immediately after the fire, the fire department reviewed its Rapid Intervention and Mayday standard operating procedures (SOP's)" (p. 2). Based on drills, training and data acquired through those drills, in the year following the incident, "the standard concept of rapid intervention is now being challenged. It is now evident that rapid intervention isn't rapid" (p. 2) As a result of the *Southwest Supermarket Fire Final Report*, the Phoenix Fire Department recommended what Kreis (2003) refers to as a "relay rescue concept" (p. 9). This recommendation follows what Sendelbach (2001) referred to as a "Safety Engine/RIT operations" (p. 15). Sendelbach also recommends multiple teams with various tasks.

The USFA technical report (Williams & Stambaugh, 2003) includes detailed and comprehensive information concerning RIT. This report includes documentation of other bodies of knowledge noteworthy to the subject of RIT, the *Southwest Supermarket Fire Final Report* being one (p. 26). This report also discusses "…in greater detail how two departments have organized their resources for firefighter rescue" (p. 24).

The number of personnel utilized for RIT varies from department to department across the nation and as well in the publications, periodicals, reports, and standards on the topic. Williams & Stambaugh (2003) state "…the firefighter rescue team should consist of at least two personnel on the initial attack (two-out) and be augmented with additional personnel as soon as possible (full RIT). One member of the RIT should be designated as the RIT officer" (p. 17). Kreis (2003) suggests 12 firefighters are needed to complete a rescue (p. 9).

Jakubowski & Morton (2001) state "…a minimum five person, two-team rapid intervention unit is ideal" (p.73). Sendelbach (2001) suggests three personnel on the initial Safety Engine/RIT and two to four firefighters for secondary and subsequent Safety/RIT companies. Coleman (2001) states, "Together, four members can stabilize and evacuate a seriously injured member" (p. 61). However, Coleman goes on to state that "…staffing constraints must not hinder the safe removal of a downed firefighter" (p. 61).

USFA (2003) identifies NFPA 1710, *Standard on Career Fire Departments, Organization and Deployment*, and its recommendation that "4 fully equipped and trained firefighters respond" (p.13). NFPA 1720, *Standard on Volunteer Fire Departments, Organization and Deployment*, recommends "2 individuals assigned outside the hazard area" (p.14). NFPA 1720 goes on to say that "…many departments should dispatch an additional company to stand by as the RIC" (p. 14).

"Regardless of the effectiveness of the IMS in place or the greatest of accountability systems, nothing is gained if personnel are not available to respond to assist when an unexpected event occurs on the fireground" (Angle, 2001, p. 151). The NIOSH reports often cite the lack of available personnel on the fireground as contributing factors. However, the need for improvement to the ICS is more often referenced. Brunacini (2002) cites the results of a 30 year experiment on IMS and states "…well-organized incidents will always produce better outcomes than their unorganized counterparts" (p. 266). He goes on to say that "…the challenge is to 'build' the organization as it is needed, to match the profile of the incident problem" (p. 266). The incident that a "Mayday" occurs will be a challenge to assess and manage.

Smith (2003) identifies stress and states we live in stress-filled times and questions whether the stress impacts performance on the fireground. Hammond (2000) speaks of four experts appearance at a congressional hearing and some of the conclusions they all four agreed on were incorrect. Two of these conclusions which were incorrect were "The compliance of human judgement is decreased by stress and stress narrows the focus of attention" (p. 6). Hammond states that "…it is still uncertain whether stress generally has a deleterious effect" (p. 6). He goes on to cite that "there are well known rules that heat, noise, and vibrations degrade performance. Yet, a number of experiments show that all three stresses can reliably improve performance, especially in tasks requiring speed and vigilance" (p. 7). Introducing stress into the training environment of RIT is a common practice. "A key element of that training was increasing the 'outside stressors' such as noise (PASS alarms, hysterical screaming, apparatus engines, chainsaws, etc.) and decreased visibility (non-toxic smoke, blackened SCBA masks) among others" (Williams & Stambaugh, 2003, p. 16).

> To create order out of chaos, a chief or company officer must understand three things in the event of a mayday. First, he should know what to expect of his crew when the distress call is heard. Second, he should understand what can and cannot be done. Third, he should know what to expect of himself. (Coleman, 2001, p. 59).

The call of a "Mayday" on the fireground will require a new size-up and possible expansion of the ICS. During this event, "…the IC must clearly understand that the stakes have been raised significantly" (Jakubowski & Morton, 2001, p. 64). This raising of the stakes and call for order requires an effective way to expand the ICS. Brunacini (2002) adds, "The faster the IC predicts the build up, the faster the correct organization can be in place to avoid playing catch up….order early, order big, manage well" (p. 274).

Jakubowski and Morton (2001) offer four options for the inclusion of RIT into the ICS (p. 65-66). Coleman (1997) shows RIT as a function of Command (p. 288). Brunacini (2002)

places RIT as "…an early responsibility of the Safety Section" (p. 289) with the creation of a Rescue Sector (p. 317) and expansion to a Branch (p. 286) if required. Kreis (2003) calls for the creation of a Rescue Sector with a search team followed by a rescue team (p. 4). Cobb (1996) recognized that the "IC may assign the rapid intervention team to a sector or division" (p. 54).

The author participated in RIT training at the Fire Department Instructors Conference (FDIC) and conducted training with TES2 Training in Brentwood, Tennessee; Norfolk, Virginia; and Baltimore, Maryland, during the course of the research project. The observation of these trainings were utilized to test the various methods of managing RIT in the ICS. As a participant, the training focused on task level operations while the observation of training conducted observed the IC in a strategic role.

In summary, there exists a wide body of knowledge on RIT. Norman (1997) says "The four prerequisites to a successful rapid intervention operation are people, policies, tools, and techniques" (p. 299). The information revealed in this review can be associated to one of the prerequisites. The reviewed literature has influenced this applied research project by displaying a need for compiling the existing information and observations into a training guideline. The information obtained from this literature review will be used to create a comprehensive training guideline that focuses on those humans who may command the fireground.

PROCEDURES

The procedure used to derive this applied research paper was determined based on the identification of a problem that if corrected would have the most beneficial and longest lasting effect on the Pleasant View Volunteer Fire Department RIT training program. The problem that no training guideline existed that identified the specific role of IC in a "Mayday" situation was identified and research began.

Based on the problem, the next step was to determine the purpose with a solution to the problem. The purpose of the applied research project was to develop a training guideline that clearly defined the role of IC in a "Mayday" situation. This purpose came at a time where the benefits of the solution would have a positive impact on the fire department because RIT training is on-going and intensive. The development of a training guideline that would address the needs of the IC role would ensure the fire department would be proactive in its mission to keep firefighters safe.

Literature review begins once potential problems are identified. A literature review at the National Fire Academy's (NFA) Learning Resource Center (LRC) in March of 2003 while attending the *Executive Analysis of Fire Service Operations in Emergency Management* course started the process of selecting a problem statement and defining a purpose. During this process, publications and periodicals were identified as potential information on RIT within the ICS. Upon return from the NFA, the author utilized a personal collection of publications and periodicals that were applicable to the applied research project. Publications referenced in information were ordered to ensure a comprehensive resource pool.

The literature was reviewed for significance and contribution to the applied research project. The information was then assessed to determine the need for reports and statistics. Reports from NIOSH and USFA were obtained via the Internet as well as featured articles on RIT and Managing the Mayday. NFPA documents were obtained from the fire departments subscription.

A search was conducted of the NFA's LRC online card catalog for other EFO papers pertaining to the subject of RIT.

The NIOSH reports were evaluated and all reports that involved a firefighter death on the interior of a structure fire were printed for review. Common contributing factors were identified from the 30 incidents published by NIOSH from 1998 to 2001. See Appendix A for complete summary report. The literature review, including reports and statistics were then utilized to create an evaluation sheet used to observe RIT training. The objective of this evaluation was to observe the action of the IC based on the criteria established from publications, periodicals, and reports.

The author assisted Tim Sendelbach of TES2 Training in conducting RIT deployment training. This training involved the use of acquired structures in Brentwood, Tennessee; Norfolk, Virginia; and Baltimore, Maryland. The acquired structure utilized in Brentwood, Tennessee, was a 5,600 sq.ft. single family ranch style home. The acquired structure in Norfolk, Virginia, was a 4,000 sq. ft., 4 unit, 2-story apartment building. The walls were breached in the apartments to join the units. The structure in Baltimore was a 3-story, Victorian, single-family dwelling with 3,500 sq. ft. per floor. Only the first floor was used for the RIT deployment.

The scenarios involved setting up obstacles in an open yard for the initial RIT deployment. Participants in groups of 12 were in full PPE with wax paper covering their mask to obscure visibility. The objectives were to enter a framed up window in the yard, deploy a search line that was marked with rings and knots to identify footage traveled; clear a path of obstacles which were loose pallets; locate the downed firefighter which was in full PPE with SCBA and PASS activated; assess the firefighter; place the firefighter on a new air source; and call for the next team to remove the firefighter. Two IC's were assigned to the Command Post for commanding the scenario. All participants were issued a portable radio for communications and accountability tags for the use of accountability to command. Pictures of the scenario and Command Post are included in Appendix B.

The next scenario used the acquired structure for RIT deployment. The structure was reconfigured to include obstacles encountered and stressors, such as noise from saws, a CD of engine and sirens, interruption in communications. The RIT deployment objectives were the same as the open yard. A hoseline was placed inside the structure to simulate a crew operating inside the structure. A mayday call was issued via radio to the IC from an instructor located at the downed firefighter using a hysterical voice with the sound of an activated PASS in the background.

The evaluation criteria included the actions of the IC. These actions included communications, accountability, expansion of the ICS, deployment of resources, and time of

benchmarks. The completed observation checklists are included in Appendix C. The results of the evaluation was used to emphasize features in the training program and focus attention to specific areas in the training guideline.

Standard operating procedures from the following departments significantly contributed to the production of the training guideline:

- Evesham Fire Rescue--New Jersey
- Snoqualmie Fire & Rescue--Washington
- Gresham Fire & Emergency Services--Oregon
- Phoenix Fire Department--Arizona
- Houston Fire Department--Texas
- Aroca Hose Company--Pennsylvania
- Fairfax County Fire & Rescue Department--Virginia
- Idaho Falls Fire Department--Idaho

An on-line survey was conducted with an email notification sent to distribution lists of the Tennessee Fire and Codes Academy and participants from former NFA classes. There were, however, not adequate numbers returned to make the survey statistically significant. The results of the survey created contacts to obtain SOP's which were utilized in the creation of the training guideline. See Appendix D.

The final procedure will be the testing and acceptance of the training guideline. This guideline was created using the data collected, as described above. Following the testing, acceptance, and any required revisions, the training guideline will be a part of on-going RIT training in Pleasant View and across the nation.

Assumptions and Limitations

An assumption was made that literature would be limited on RIT within the ICS. Another assumption was made that those who were actual IC's in the departments would participate in the training. A final assumption was that all times for the evaluation could be observed.

The limitations of this applied research project was the availability of other fire departments training programs to evaluate. Another limitation was the amount of actual IC's participating in the training programs. The variation in how NIOSH cites various aspects of a firefighter fatality was another limitation of the applied research project. A final limitation was the available instructors to be at all locations of the evaluations to document times not reported to the IC by the participant.

DEFINITION OF TERMS

Incident Commander (IC): The overall director of an incident or event who is responsible for providing responder and citizen safety and survival, stabilization of the incident, and the conservation of the environment and property.

Incident Command System (ICS): A predetermined system for the command and control of an incident or event that defines the roles and responsibilities to be assumed by personnel in the quest for a successful outcome.

Mayday: The emergency condition where a firefighter may be lost, trapped, missing, or disoriented to a level assistance will be needed. The broadcast of this message may be via radio from the member or crew needing assistance or declared by the incident commander.

Rapid Intervention Team (RIT): A minimum of two personnel, ideally five personnel assembled in a ready state of an event where other personnel are in a hazardous or potentially hazardous environment with the purpose of locating, assessing, stabilizing, and removing a downed or trapped firefighter from harm. The RIT may be referred to in various organizations as FAST, RIC, or Go Teams.

Scenario-Based Training: The creation of realistic conditions in a controlled environment used to simulate the event that training objectives may be accomplished and evaluated.

Standard Operating Procedures (SOP's): May also be referred to as operational guidelines but remain directives for an organization in the form of an established course of action that is described in written form.

Strategic Level: Overall Command and direction of an incident or event.

Tactical Level: The mid-management and direction of workers.

Task Level: The work activity required to reach the objective.

RESULTS

The results of this applied research project were compiled from the literature reviewed and procedures performed. The research questions were answered using an examination of periodicals, books, Internet, standard operating procedures, observations at RIT training, and an online survey. The questions posed for this applied research project are listed here with the results and findings in a logical and narrative format.

What recommendations are made by NIOSH reports of firefighter fatalities during structural fire operations concerning the function of the ICS? The NIOSH reports included recommendations to fire departments that should minimize the risk of similar occurrences.

NIOSH clearly states the purpose of the program is to determine factors that cause or contribute to firefighter deaths suffered in the line of duty.

According to Kolomay & Hoff (2003):

> Although NIOSH explicitly expresses that their investigations are to call national attention to injuries and fatalities of firefighters and not to place blame or fault, it must be recognized that research reveals many fireground injuries and fatalities are due to the following repeated reasons:
>
> - Poor physical fitness
> - Poor fire/rescue training
> - Inadequate staffing
> - Poor communication and communication systems
> - Inadequate equipment and apparatus such as SCBA (self-contained breathing apparatus), PASS (personal alerting safety system) alarms, and thermal imaging camera
> - Lack of written fireground procedures
> - No accountability system (p. 2).

The 30 NIOSH reports reviewed for this applied research project found similar contributing factors. The following table shows the factors cited:

Table 2
Contributing Factors to Firefighter Fatalities

Factors	# of times cited
Accountability	14
IC-Size-up	14
IC- Risk Management	15
IC- Location/Function	8
RIT Ready	21
Adequate Personnel	9
Team Continuity	4
Separate ISO	7
Ventilation	10
PASS	16
Evac Signals	7
SOP's	15
Tactics	17
Radios/Communications	16

Williams & Stambaugh (2003) states "The use of RIT is only one way to prevent firefighter deaths" (p. 3). The findings of the NIOSH reports are consistent with the literature on RIT. The results of the 30 NIOSH reports included information that assisted with the focus of the training guideline. The following table identified the type of fire department and the rank of the firefighter fatality:

Table 3
Comparison of Department and Firefighter Rank

Career Department	18
Volunteer Department	17
Rank--Firefighter	33
Rank--Captain	5
Rank--Lieutenant	4
Rank--Chief Officer	3

An additional finding that was unexpected concerned information the IC had to operate from. The following table identifies the fact that a mayday call was issued or not, and if the initial IC had information of civilians trapped:

Table 4
Documentation of Mayday Called & Civilians Trapped

	Yes	No	Unclear
Civilians Reported Trapped	9	18	3
Mayday Called	14	13	3

The data used to assemble tables 3 and 4 are listed by each NIOSH report number and year and is included in Appendix A.

How are RIT's deployed and managed under current training programs and existing systems? Deployment and management of the RIT varies from department to department and IC to IC. The findings were inconsistent as to where RIT fits into the IMS. Jakubowski & Morton (2001) suggests "…each department needs to determine where the RIT best fits within its IMS" (p. 64). A similar finding was made concerning the expansion of the ICS when multiple RIT's were deployed.

A review was made of 19 total procedures, guidelines and/or training programs, of which eight were used to compile the training guideline. Only three of the 19 were specifically created with training in the title. All three of these were task driven and varied in length and content. However, the recommendations gained from the procedures and guidelines were consistent with other literature reviewed. The deployment of the RIT was consistent but the designation under the ICS varied from using company designation, i.e., Engine 28 as RIT 28, to functional named, i.e., RIT Search, to number designations, i.e., RIT 1, RIT 2.

The result of the scenario based trainings were consistent time expectations based on what Kreis (2003) reports "…an average of 5.33 minutes to locate a downed firefighter once deployed and 21.8 minutes to remove with two firefighters" (p. 8). The results from the acquired structures of the 8 scenarios in the house averaged 26.87 minutes to remove the trapped firefighter and 9.62 minutes to locate. The IC never expanded the ICS to include a Branch officer, 1 IC expanded to the function of Operations, and in 8 of the 15 scenarios the IC assigned RIT in the ICS as a function (i.e., RIT search versus RIT #1).

Communications proved to be an issue on all scenarios. During the 15 scenarios no RIT reported their location in relation to the search rope they were deploying. Also, in 10 of the 15 scenarios, the IC had times when they could not account for personnel. This was a result of the fact that an average of 4.6 times per scenario the IC could not make radio contact with the RIT. As a result of this, the IC committed a RIT for the RIT in 4 of the 15 scenarios. The complete results of these scenarios are shown in Appendix C.

What is the average number of firefighters used to rescue a downed or trapped firefighter? The *Southwest Supermarket Fire Final Report* (2002) and Kreis (2003) cite an average of 12 firefighters to rescue 2 firefighters in their training scenario. The SOP's obtained also varied in RIT size from two to five on the initial to the expansion to as many needed but no total recommended to be available beyond initial deployment. The average number of firefighters used, or listed in the NIOSH reports, was five. The results of the training scenarios conducted by the author averaged the need for 11 firefighters to execute the rescue of a trapped or downed firefighter.

What is the most effective way to expand the ICS to manage multiple RIT's deployed? The results of literature review discovered several recommended practices for the management of RIT's. The ICS is very flexible and the placement and designation within the incident organization varies. Kolomay and Hoff (2003) identify that "…for rapid intervention operations proper radio identity is crucial" (p. 61). With this being said, where does the RIT fit in the ICS and what does the IC call them?

Jakubowski & Morton (2001) offer four options to fit RIT into the IMS and they offer the advantages and disadvantages to each option. They offer that RIT may report directly to the IC, to Safety, to Operations, or to Staging. Coleman (1997) states "…if Command or Operations believes that more than one RIT is needed, he can divide the original RIT into groups and assign additional firefighters to work with them" (p. 294). Phelps, Murgallis, & Joerschke (2002) do not address the specific identification if multiple RIT's are deployed, however, they offer specific examples of progression to the RIT deployment as associated with the fireground (p. 59).

Brunacini (2002) and Kries (2003) calls for the creation of a RIT Branch that includes a Rescue Sector, which includes a RIT Search and RIT Rescue, all of which ultimately report to the Safety Section. Coleman (2002) also refers to "RIT Support," which was also utilized in a few of the scenario-based training drills observed. The results of this applied research project created a training guideline for incident commanders in the "Mayday" situation. See Appendix D.

DISCUSSION

"The next challenging problem is how to reduce the fireground deaths that are actually caused by the inherent risks we normally associate with fighting fires, such as being caught or trapped inside burning buildings, running out of air, falling through roofs or floors and having parts of buildings fall on us" (Routley, Bush, & Stern, 1996, p. 50). Here the periodical discussed the statistics of firefighter fatalities and what the fire service can do to prevent line-of-duty deaths. They continue to say, "…we could save lives if every incident was managed from the outset by a qualified incident commander using a standard incident management system" (p. 52). These recommendations were not heard by the fire service because many of the things mentioned would end up being recommendations of NIOSH reports, which would not be until 2 years following the periodical.

The information available from NIOSH reports provide recommendations to fire departments on how to minimize future risks from such events. These recommendations and review of the incident itself must be included in training sessions. Of the 30 NIOSH reports reviewed, 7 recommended ensure that some type of tone or alert that is recognized by all firefighters be transmitted immediately when conditions become unsafe for firefighters. Dunn (1999) identifies that "an emergency withdrawal is a rare occurrence in the fire service and because it's a rarity, it's usually accompanied by confusion and delay once the order is given" (p. 262). RIT training must include the use of emergency tones or signals. The IC must be trained when to order a withdrawal and firefighters trained to recognize and react.

Firefighters in trouble radioed "Mayday" in 14 of the 30 incidents reviewed according to the NIOSH reports. Training must be conducted not only during RIT training but also during normal fire operations. Clark (2001) recommends we "…ask our personnel at the next company drill when they would call for a mayday" (p. 5). Sendelbach (2001) lists "initiating the emergency mayday call as the first step in standardized self-survival actions" (p. 12). Once the "Mayday" call comes into the IC, he or she must be prepared. 21 of the 30 NIOSH reports indicated that a RIT was not ready and/or in place. Additionally, 23 of the 30 reports directly made recommendations for improvement of the IMS or the IC in size-up and risk management.

Brunacini (2002) says it well:

> This risk management decision/plan becomes a very practical expression of our most critical organizational philosophy--how we will actually manage the connection between risk and benefit [lives/property] at service-delivery time--is the risk to my troops worth the benefit to the customers? (p. 241).

The IC should utilize what Brunacini calls a Safety Tactical Reserve where "IC quickly establishes Rapid Intervention Crews (RIC) who maintains continuous availability to respond to any hazard-zone safety issue. IC upgrades size and number of RIC teams based on the ongoing incident profile" (p. 246).

Cobb (1996) recognizes "…the rescue of firefighters in a burning building is time sensitive" (p. 54). Smith (2003) expands on this to further define the time by saying "…you have 4 minutes to get the victim(s) on fresh bottles" (p. 3). Kreis (2003) reports that it takes an average of 2.47 minutes for the RIT to be briefed by the IC and be in the "ready state" plus an additional 2.55 minutes to make entry from the time the mayday call is issued (p. 8). The time Smith (2003) refers to must be if the firefighter is out of air, which further reinforces that the mayday call must be made early. As noted by Williams & Stambaugh (2003) "…the IC must be able to quickly activate a firefighter rescue team" (p.17).

The IC must execute many decisions during a "standard" operation. However, when the "Mayday" call comes in the situation changes and the incident expands. The decisions required by the IC at this point will be stressful. Klein (1999) calls these high stakes decisions and says "…the fireground commander needs the power of intuition, mental simulation, metaphor, and storytelling" (p. 3). I refer to these as training, capability, experience, and critiques. Contrary to Klein, Hammond speaks of judgments made of the famous Mann Gulch fire. Hammond (2000) states, "As a result of his analytical creativity, however, the foreman survived by thinking out this innovative solution that required him to act directly counter to what intuition was demanding" (p. 79). Klein (1999) estimates "…that fireground commanders make around 80 percent of their decisions in less than one minute" (p. 4). Despite the contrast in the subject of decision making, the IC must make critical decisions that will potentially affect the lives of others.

Jakubowski & Morton (2001) say that "…if companies do not actively practice their skills, they may not be able to perform them under the stressful and difficult conditions of real rescue" (p.54). These companies and skills should include the person who will fill the role of IC. NFPA 1500, 5.3.6 says "…members shall practice assigned skill sets on a regular basis but not less than annually" (p. 13).

Regardless of the stress and decisions that must be made, the "Mayday" event will require what Coleman and Lasky (2000) refer to as a "strong command presence" (p. 58). "Good outcomes are a product of effective, well-managed operations" (Brunacini, 2002, p. 357). In order to manage well, Cobb (1998) suggests, "…the rapid intervention team should be assigned as part of the incident commander's overall strategy and tactics" (p. 56).

A strong IC and a well managed fireground will allow action to be taken when confronted with a hazardous situation. Strong supervision and an expanded ICS is a requirement of a well managed fireground. Dunn (1999) recommends that "…when necessary, a fireground commander may direct another chief or experienced officer to operate in a danger area. This is to increase the supervision of safety procedures, as well as to analyze the danger from a close perspective.

Brunacini (2002) recommends that the ICS expand with the incident and states that a command team is "…a local-management team that can quickly form and front-end load an effective, strong command effect into an incident operation. The command team concept is designed to fill the gap between a single IC and the full blown ICS section (safety, ops, planning, logistics, and administration) level" (p. 279). The Pleasant View Volunteer Fire Department and Ashland City Fire Department have agreed as a result of the training guideline and recent events to increase the number of chief officers sent on structure fires. In the *Southwest Supermarket Fire Final Report*, Tobin & Kreis (2002) even recommend "command officers must be assigned to manage sectors early in the offensive strategy" (p. 27). This change will increase the capability to manage the fireground. The result of this will require a return to our stronger joint fire department training program and the training guideline will be presented to both departments. "I'm in charge here is replaced by what can I do to help?" (Brunacini, 2002, p. 184).

One of the challenges for the command team will be to manage emotions of the firefighters who will want to rush in to help. Coleman & Lasky (2000) say "…the first thing Command can expect is mutinies" (p. 56). They continue to say "…to control mutinies, you must do three things: expect them, practice how to react to them (which will lead to the next step), and control them" (p. 56). The Pleasant View Volunteer Fire Department and Ashland City Fire Department have a great relationship from the firefighters to the chiefs and one of the greatest aspects of this relationship is the respect and trust. Through the training guideline and practice the departments will only ensure greater firefighter safety.

The relationship between the Pleasant View Volunteer Fire Department and Ashland City Fire Department have excited the Henrietta Volunteer Fire Department and a change in chiefs at the Two Rivers Volunteer Fire Department has further improved the relationship between all departments. These improved relationships will allow all departments involved to use the Williams & Stambaugh (2003) recommendation that "…departments should dispatch an additional company to standby as RIT" (p. 14). Angle (2001) recognizes the need when he states "some smaller departments are utilizing automatic and mutual aid in order to staff an on-scene RIT" (p. 152).

The number of firefighters used for the makeup of a RIT varies from department to department, publication to publication, and incident to incident. The numbers vary with the nature of the event and any recommendation is pure speculation. An example is Coleman (2001) saying "four members can stabilize and evacuate a seriously injured member" (p. 61). This statement would have to be from an event with ideal conditions and the downed firefighter on the porch. The key to successfully deploying RIT in appropriate numbers is to have a pool of personnel in staging. Departments may have to be called, but get them coming safely.

The training guideline had to address the number of personnel that should be assigned to the RIT. Coleman (1997) states:

> I certainly can justify not assigning a RIT at my normal residential and small commercial structure fires, but I would be hard-pressed to the witness stand and justify why I failed to assign a RIT at one of those special fires we get every now

> and then. I know the risks involved. I was of the concept of rapid intervention and the standard that defines it. It's tough to justify my not special calling for one additional unit when I know a definite risk was present (p. 289).

This statement is invalid and Coleman probably wishes he could retract it. The NIOSH that were reviewed for this applied research project indicated 11 firefighter fatalities in single family dwellings.

The training guideline compiles the information available into a format that focuses on the training of the IC during RIT training currently being conducted. Norman (1998) recommends "keep it simple, stupid! Avoid setting up fancy systems when a simpler method will suffice" (p. 305). Therefore, the training guideline begins with the availability of a RIT early in the incident and progresses through the training scenario to the end where it terminates with a critique and re-training.

Kolomay and Hoff (2003) recommend a "team-teaching approach" (p. 212). They continue to say "Combining instructors into a credible team can round out credibility gaps and provide a high level of instructional quality" (p. 212). In order to conduct scenario-based training, a group of instructors is a must. The more instructors, the more information that may be obtained.

The production of a training guideline as a result of this applied research project is intended to not only serve to train the IC's of the Pleasant View Volunteer Fire Department and Ashland City Fire Department but to incorporate as training for IC's into TES2 Training classes across the country and as an Instruct-O-Gram in the VOICE, a publication of the ISFSI. Simply writing a SOP or standard operating guideline for the department will not be sufficient. Coleman and Lasky (2000) recognize this when they state "It's like a lot of the procedures we have on paper: If we don't train in them, they won't work when we need them" (p. 51). The author recommends that all department SOP's should either be replaced by training guidelines or at least have a training guideline associated with all SOP's to ensure our members have experience on them. The findings of this applied research project should be shared with other departments to ensure focus is placed not only on training to the task level but also training the IC. The VOICE and TES2 Training will be a good means of marketing to the IC's for the needed training on managing the "Mayday" event.

The results of this study indicate that expansion of the ICS to include a more clearly defined IC role will have positive results for the fire department and all fire department personnel.

RECOMMENDATIONS

The recommendation for the future based on the literature review, observed training, and the analysis of the results is that the training guideline be implemented into the Pleasant View Volunteer Fire Department. The command team of future incidents must have training on the

expansion of the ICS. Training and experience is recommended to improve expertise, and both of these are intended to occur in a controlled and safe scenario-based training program.

As the literature review and results showed, incident command systems that address the role of the IC in a "Mayday" situation are hard to find. The issue is complex, especially when the goal is to create a training guideline and scenario that will reach those who will ultimately command the scene.

Leaders in the fire department have the opportunity to impact training procedures and guidelines by being involved in the process. There is no way to know what is about to happen, unless you are involved in the training process. This demands that fire department personnel be aggressive in their hands-on training scenarios. When warranted, fire service officers need to participate in RIT training and know the role that they will play when reality takes the place of the scenario. Leaders in the fire department can not and should not assume that they will be able to handle all aspects of the command system. When a firefighter is down or trapped and a RIT is deployed, there needs to be someone in the command role that can handle the situation and help create the positive outcome of firefighter(s) saved, not lost.

Because of the results of the fire department surveys that showed there is not a training guideline for IC to duplicate, my recommendation is that the training guideline created as a result of this applied research project be incorporated into the command structure for a "Mayday" situation.

A recommendation to the future readers of this Applied Research Project is to continue to research and to design a guideline that addresses the needs of your department and situation. Also, it should be stated that exploration on this topic will continue in the hands-on RIT training sessions across the nation. It is safe to say that because of the dynamic nature of a fireground, improvement of the strategies, guidelines, and command structure will be on-going. "Mayday" scenes will always be stressful, but there is no doubt that we can learn from those who have gone before us, and we can strive to train and improve at each fire scene.

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Appendix A
Summary of Niosh Reports

Fire #	Victim #	Age	Status	Rank	Years Exp.	Civilians Reported Trapped	Mayday Called	# of RIT Team Members	Structure Type Single Family Multi-Family Commercial
F1998-04	1	25	V	FF	11	No	Yes	2 (Chief + Lt. From other dept.)	Commercial
F1998-05	2	40,40	C	FF,FF	2,9	No	No		Commercial
F1998-06	2	43,29	V	FF,FF	10,5	No	Yes	2	Single Family
F1998-07	1	38	C	Capt.	17	No		Engine 15	Commercial
F1998-17	2		C	Capt., Lt.	20,21	Yes	Yes	7	Multi-Family
F1998-21	2	35,21	V	FF,FF	3,4	No	No	Limited lack of air	Commercial
F1998-26	1		C	Capt.	20	Yes			Multi-Family
F1998-32	2	24,29	V	Lt., Chief	8,15	No	Yes	2	Commercial
F1999-02	1	22	V	FF	13 months	No	Yes	3	Single Family
F1999-03	1	52	C	FF	29	Yes	Yes	9	Commercial
F1999-04	1	27	V	Capt.	Not stated	No	No		Church
F1999-21	2	30,29	C	FF,FF	6 ½ , 3 ½	No	No	None organized	Multi-Family
F1999-47	6	34,38, 38, 41,42, 51	C	FF's	12,2,8, 16,20,27	Yes-homeless	Yes	?	Commercial
F1999-48	1	47	C	Bat. Chief	26	No	Yes	4 teams + extras	Commercial
F2000-04	3	49,39, 29	C	FF's	25,4,5	Yes	Yes	3	Multi-Family
F2000-09	1	74	V	FF	11	No	No	3/3 (2nd time)	Single Family
F2000-13	2	44,30	C	FF,FF	18 ½ , 5 ½	No	No	2	Commercial
F2000-16	1	27	V	FF	5	Yes	No	None designated	Single Family
F2000-23	1	36	C	FF	10	Conflicting Reports	Yes-IC never heard	2 – never designate, then 3	Single Family
F2000-26	1	33	C	FF	8	No	No		Single Family
F2001-04	1	27	V	FF	14	No	No	7	Single Family
F2001-08	1	29	V	Lt.			No		Single Family
F2001-09	1	46	V	Asst. Chief	6	No	No		Commercial
F2001-16	1	38	C	FF	20	Yes	Yes	5- RIT #1 2 – RIT#2	Single Family
F2001-13	1	40	C	FF	8	Ordered to check	Yes	36	Commercial
F2001-15	2	36,39	V	Lt., FF	2 ½, 1 ½	No	No	4	Single Family
F2001-18	1	40	C	FF	10	Yes	Yes		Multi-Family
F2001-27	1	22	C	FF	4	No	No	No	Single Family
F2001-23	3	50,46, 40	C	FF,FF, FF	27,14,11	No	Explosion		Commercial
F2001-33	1	40	C	Capt.	20	Yes	Yes		Multi-Family

1998 NIOSH FACTORS SUMMARY

Factors	F1998-04	F1998-05	F1998-06	F1998-07	F1998-17	F1998-21	F1998-26	F1998-32
Accountability				√	√	√	√	√
IC-Size-up		√	√	√	√			
IC-Risk Management				√	√			
IC-Location/Function	√		*			√		
RIT Ready	√		√	√	√	√	√	√
Adequate Personnel				√			√	
Team Continuity								
Separate ISO			√					
Ventilation		√						√
PASS	√					√	√	√
Evac Signals				√	√			
SOP's			√			√	√	
Tactics			√			√	√	
Radios/ Communications			√	√	√	√	√	

* = *clear violations, but not mentioned by NIOSH*

1999 NIOSH FACTORS SUMMARY

Factors	F1999-02	F1999-03	F1999-04	F1999-21	F1999-47	F1999-48
Accountability			*		√	√
IC-Size-up	√					
IC-Risk Management	√	√		√	√	
IC-Location/Function	*		*		√	
RIT Ready		√		√	√	√
Adequate Personnel	√					
Team Continuity						
Separate ISO		√			√	
Ventilation				√		√
PASS	√		√	√		√
Evac Signals		√		√		
SOP's	√		√	√	√	√
Tactics	√		√		√	√
Radios/ Communications	√			√		√

** = clear violations, but not mentioned by NIOSH*

2000 NIOSH FACTORS SUMMARY

Factors	F2000-04	F2000-09	F2000-13	F2000-16	F2000-23	F2000-26
Accountability	√		√	√	√	
IC-Size-up	√		√		√	
IC-Risk Management	√		√		√	
IC-Location/Function				√	√	
RIT Ready	√	√		√	√	√
Adequate Personnel	√		√			
Team Continuity						
Separate ISO					√	
Ventilation		√	√			
PASS	√			√	√	√
Evac Signals						
SOP's		√	√		√	
Tactics	√			√	√	√
Radios/ Communications	√		√	√		√

2001 NIOSH FACTORS SUMMARY

Factors	F2001-04	F2001-08	F2001-09	F2001-16	F2001-13	F2001-15	F2001-18	F2001-27	F2001-23	F2001-33
Accountability	√	√				√		*		
IC-Size-up	√	√			√	√	√	*		√
IC-Risk Management	√	√	√	√		√		*		√
IC-Location/Function			√				√	√		
RIT Ready	√	√			√		√	*		√
Adequate Personnel						√	√	√		√
Team Continuity	√					√	√	*		√
Separate ISO	√	√		√				*		
Ventilation	√	√				√			√	
PASS	√			√		√	√			
Evac Signals	√				√	√				
SOP's		√			√		√	*		√
Tactics	√			√			√	√	√	√
Radios/ Communications	√			√		√	√	*		

* = *clear violations, but not mentioned by NIOSH*

Appendix B

The Command board used by the IC to manage the "Mayday" event. Here accountability, communication, and time management are monitored and tracked.

Modifications made to the interior of an acquired structure to simulate obstacles encountered during RIT operations.

Firefighters follow the search line while trying to exit the structure. Here stressors have been introduced on the floor and hanging from the ceiling.

RIT Recon clears pathway as they search. The RIT Recon officer must remember to report location to the IC while ensuring crew continuity.

RIT Recon makes entry, 1st 2 firefighters clear a path as directed by 3rd member, who is the officer, while the 4th member is the tote and brings the air supply.

RIT Recon secures a new air supply to the downed firefighter. This team is preparing the firefighter for RIT Rescue to remove. Notice the clear path back to the window.

Note to the IC--RIT members can't always respond to radio traffic, be patient, yet don't forget them.

RIT Rescue works to move the downed firefighter through the wall, the RIT Rescue officer radios the IC of their status.

Appendix C
Hands-on RIT Training Observations

Checklist/Evaluation *Data Collected by Shane Ray*

Class: Baltimore, MD Firehouse Expo Date: 7/23/03

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
Location of Exercise	Yard	Yard	House	House	House	House
# of FF's total	9	9	12	12	8	8
# of IC's who created a Rescue Branch	0	0	0	0	0	0
Did the IC's expand the ICS to include Operations Section & Planning Section	N	N	N	N	N	N
Did the IC's functionally name RIT as they were deployed	Y	Y	Y	Y	Y	Y
# of times the IC could not account for personnel	2	0	5	1 wrong channel corrected	3	1
Number of RIT's deployed	2	2	3	2	3	3
Did RIT report location?	N	N	N	N	N	N
# of Maydays called out by RIT members	0	0	0	0	0	0
# of times members did not respond to command radio traffic	3	2	5	3	7	3
# of times Command committed another RIT team for RIT	1	0	0	0	1	0
How many FF's would not have made it out	0	0	3	0	1	0
Time to locate the FF	3:50	4:05	09:50	10:05	7:22	5:45
Downed FF on air	Not reported	6:11				
RIT Rescue In	8:40	5:10			6:32	3:06
RIT Rescue at FF	10:22	8:05			10:09	9:50
RIT Search out	13:30	10:30	15:51	12:51	13:11	15:09
Started Removal	15:19	10:05	16:40	11:55		13:47
Downed FF Out	19:14	12:45	22:40	18:57	18:39	15:09

Checklist/Evaluation *Data Collected by Shane Ray*

Class: Brentwood, Tennessee Date: 3/10/03

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Location of Exercise	Yard	Yard	Yard	House	House
# of FF's total	12	12	12	24	24
# of IC's who created a Rescue Branch	0	0	0	0	0
Did the IC's expand the ICS to include Operations Section & Planning Section	N	N	N	N	Y
Did the IC's functionally name RIT as they were deployed	N	N	N	Y	Y
# of times the IC could not account for personnel	1	0	0	7	1
Number of RIT's deployed	3	3	2	4	4
Did RIT report location?	N	N	N	N	N
# of Maydays called out by RIT members	0	0	0	2	0
# of times members did not respond to command radio traffic	7	2	0	Approx. 15	5
# of times Command committed another RIT team for RIT	0	0	0	2	0
How many FF's would not have made it out	0	0	0	3	1
Time to locate the FF	4:21	3:15	3:06	12:51	8:22
Downed FF on air	7:05	6:20	4:33	Not reported	10:05
RIT Rescue In	5:15	4:30	4:10	3:20	5:02
RIT Search out	10:10	8:03	7:02	14:02	16:00
Started Removal	11:02	7:42	8:19	31:05	22:41
Downed FF Out	15:25	14:19	12:44	42:12	34:04

Checklist/Evaluation *Data Collected by Shane Ray*

Class: Norfolk, Virginia Date: 4/11/03

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Location of Exercise	Yard	Yard	House	House
# of FF's total	9	9	18	18
# of IC's who created a Rescue Branch	0	0	0	0
Did the IC's expand the ICS to include Operations Section & Planning Section	N	N	N	N
Did the IC's functionally name RIT as they were deployed	N	N	N	N
# of times the IC could not account for personnel	0	0	3	4
Number of RIT's deployed	3	3	5	3
Did RIT report location?	N	N	N	N
# of Maydays called out by RIT members	0	0	1	1
# of times members did not respond to command radio traffic	5	3	3	6
# of times Command committed another RIT team for RIT	0	0	0	2
How many FF's would not have made it out	0	0	1	1
Time to locate the FF	5:05	4:18	12:20	10:22
Downed FF on air	Not reported	5:51	Not reported	12:10
RIT Rescue In	6:06	4:48	8:12	11:00
RIT Search out	11:10	9:02	11:05	16:12
Started Removal	12:44	11:20	19:46	14:40
Downed FF Out	19:21	14:28	29:12	21:04

Appendix D
Training Guideline

Purpose: This training guideline will be used in conjunction with the training guideline for search line survival, RIT deployment, and RIT Combat.

Objective: The objective of this training guideline is to ensure the IC is prepared for a RIT deployment and that the IC can expand the incident organization to successfully manage the RIT deployment and complete the scenario without any additional loss of life.

Notes for the Instructors:

- Start with an organization chart for the fire
- Have an accountability system in place that will include the positions on the organizational chart in place on the fireground
- Single IC in the CP or (normal staffing of the CP)
- Have the IAP for the fireground (the instructor can create this based on the participants and the complexity of the mayday scenario, which will be dependent on the acquired structure or training facility.
- Have an accountability system in place that will include the positions on the organizational chart in place on the fireground
- Have the instructors that are simulating attack crews prepared to answer the IC for an accountability report

Are you Ready for the Mayday?

- RIT in place and ready to respond
- Briefing with the RIT officer
- Proper resources in staging (can you put a minimum of 12 personnel into play)
- Do you have a Command team assembled in the CP?
- What is the risk versus gain at this point in the incident?
- Where are crews operating
- Are civilians missing?
- Exposures endangered
- Water supply
- Access to equipment and spare SCBA's
- Other radio channels available
- EMS on-scene
- Elapsed time notifications from Dispatch

RIT Officers Size-up:

- Conditions of the building, size of building, pre-plan of building reviewed
- Location of crews operating
- Access points for crews operating clear for RIT deployment
- Water supply ready for RIT operations
- Type of construction and age

- Experience level and prediction of those operating inside (use from knowledge of other trainings) NOTE: This is one of the reasons it is extremely important for all IC's to actively participate in training.
- Possibility of collapse--can you stabilize and what time prediction can you make for operating and how would you get to them (i.e., attack hose line, vent ladders/search team --rope or ladder if VES)
- How long have events been underway
- Fireground radio traffic--calm versus raised voices, how air alarms, PASS devices, requests, etc.
- Control of entry points--accountability personnel available
- RIT officers brief of findings with RIT members
- RIT officers brief back to IC--info from size up--evaluation of current resources and request for more.

INSTRUCTOR: Make sure that when emergency traffic is called in the Search Line Survival Program, the IC reacts by informing and briefing the RIT officer and assesses the resources in staging.

The Mayday Call is Transmitted

An instructor will be with the downed firefighter and transmit the mayday in an excited and labored voice. Make sure the PASS is sounding in the background when using the trapped scenario. May also use the low air alarm, escaping air from the SCBA mask, sounds of water flowing, etc. The key is to produce stressors for the IC and make the call real.

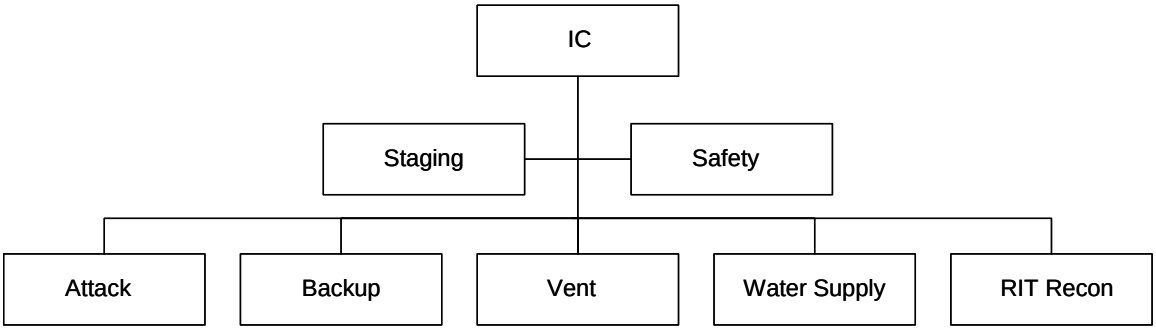
The IC should:

- Announce the confirmed receipt of the Mayday and have other fireground operations switch channels for a PAR except RIT--announce RIT will remain our primary

NOTE: This is a seamless operation, make sure crews that are operating interiors can switch channels and ensure that the crew of the firefighter down doesn't switch. Have all exterior crews switch, to another channel and anyone with requests switch. The key here is that companies operating interior need to hear the downed firefighter transmission.

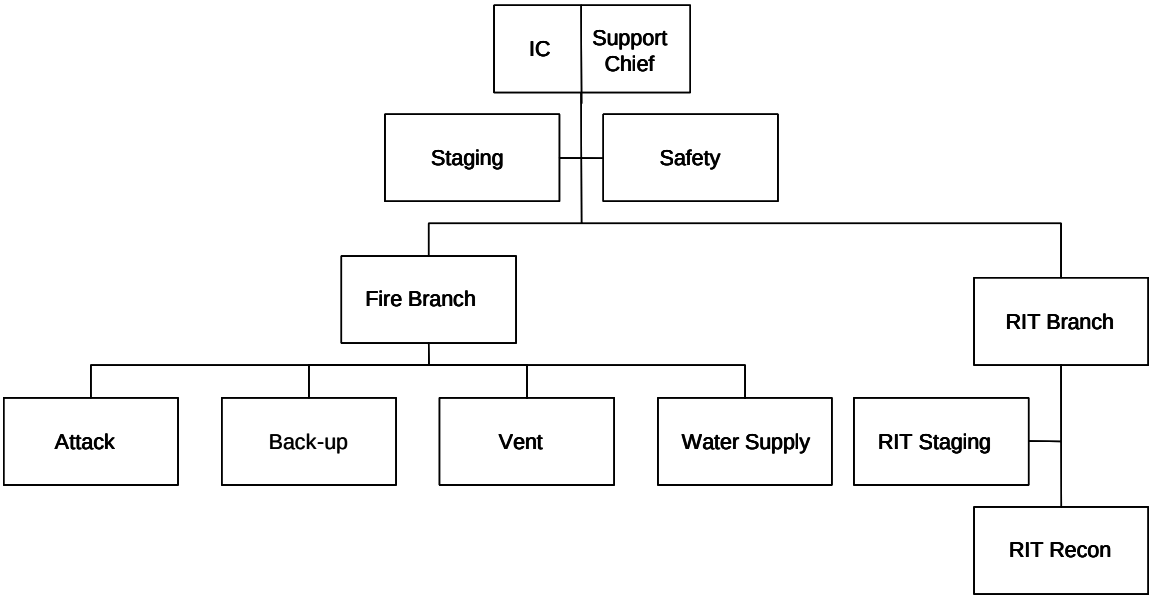
- Deploy RIT Recon--make sure they report their location by identifying position as indicated on the RIT research line (this is the trackable means that use the knot system for footage markers.
- Withdrew all non-essential crews, this is those not directly involved with suppression efforts or those that report they have contact with the downed firefighter
- Have the support officer in the CP pull resources from staging to RIT staging on-scene and request double the resources from dispatch.
- Assign an accountability officer in the CP and one at the entry point to confirm the number of personnel in the structure.

NOTE: At this point, the incident organization may look somewhat like this:



- Create RIT Branch and Fire Branch to prepare for the expansion of the incident organization.
- Assign a Chief Officer or highly experienced officer to the RIT Branch

NOTE: This changes the incident organization to look something like this:

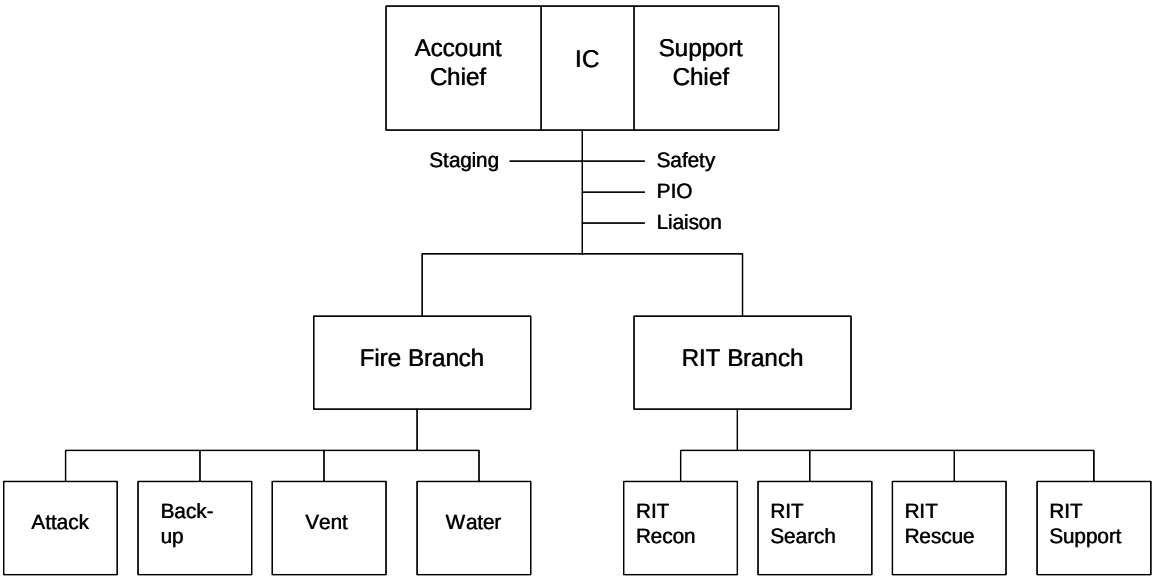


NOTE: The deployment of RIT when multiple teams are required should be a consistent order of progression. The functions assigned are for the purpose of maintaining control of the incident organization.

- Maintain accountability of assigned crews through the use of the AS
- Track location through the use of the tags and rope system
- Re-evaluate and coordinate with other functions of command
- (Make list of the things to avoid--calling too much, etc.)
- RIT Recon--light entrance, clear path, deploy rope, monitor conditions, evaluate situation.
  - If RIT Recon does not locate the firefighter, deploy RIT Search
  - If RIT Recon needs tools for access or additional equipment deploy RIT support
  - If RIT Recon locates firefighter and prepares for removal deploy RIT Rescue
- RIT Search--locate firefighter, assess firefighter, give CAN report, secure air supply, locate secondary means of escape or removal
- RIT Rescue--follow rope to firefighter, prepare and package firefighter for removal, begin or complete removal
- RIT Removal--complete the removal of the firefighter from the structure
- RIT Support--provide tools, equipment, personnel, or anything requested by a previously deployed RIT

NOTE: The key to such a system is that 5 RIT's can be deployed by functional names with the goal of safely removing the firefighter and not losing any more personnel. This system works well when members of the RIT are made up of personnel assembled at the scene from different companies or departments.

The incident organization may appear like this:



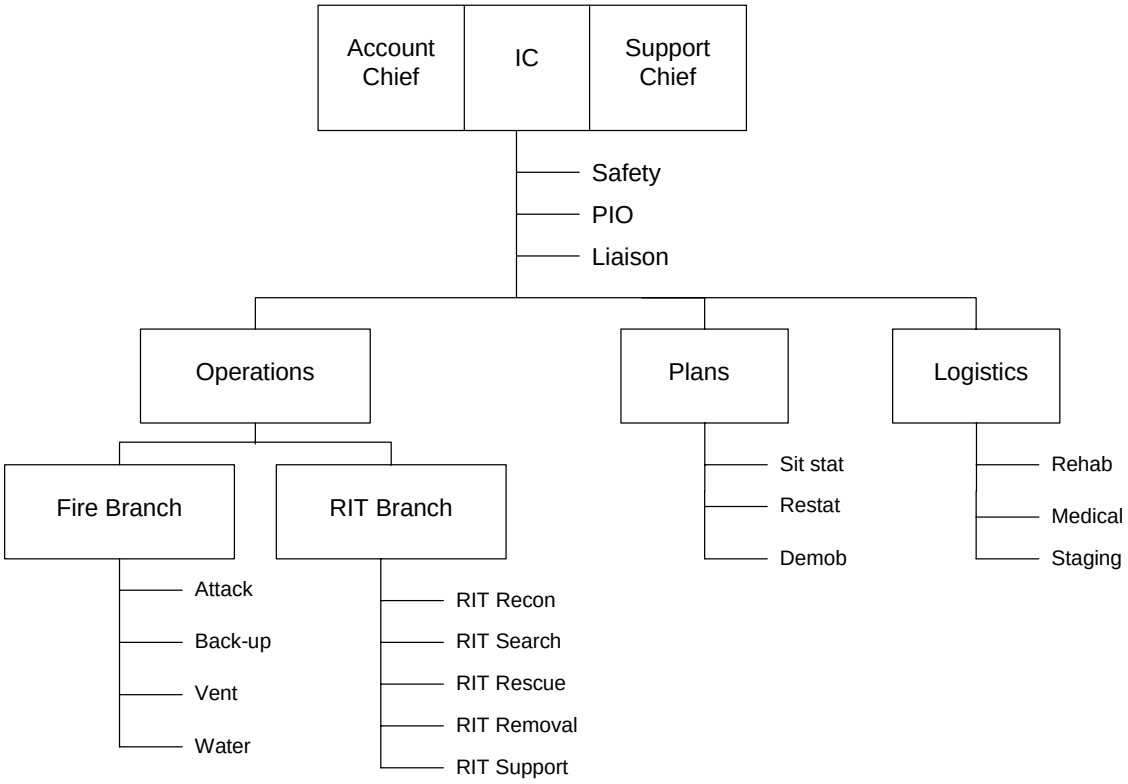
It is recommended that no more than three of the RIT functions be deployed at any given point. Example, RIT Search is at the firefighter, RIT Rescue is moving in to extract the firefighter and additional air supply is needed. This scenario means that RIT Recon is out, RIT Removal has not been utilized and RIT Support is being deployed.

- Recognized the benchmarks of the RIT operation
  - Firefighter located
  - CAN report, air secured
  - RIT Rescue In
  - RIT Search Out
  - Removal of Firefighter started
  - Downed Firefighter out
- Monitored and tracked the time of benchmarks

A fully expanded incident organization may end up like this:

- Expand the IC creating an Operations Section, Plans Section, and Logistics Section
- Make sure the liaison and PIO are in place to provide information to the media and work with other organizations
- Assign chiefs to fill the operations and logistics sections

Operations	Plans	Logistics
- RIT Branch	- Refining IAP	- Providing Rehab
- Fire Branch	- Evaluating Incident Organization	- Medical Stand-by
- Medical Branch	- Forecasting Future	- Managing Staging
	- Resource Recommendations	


Account Chief
IC
Support Chief
Safety
PIO
Liaison
Operations
Plans
Logistics
Fire Branch
RIT Branch
Sit stat
Restat
Demob
Rehab
Medical
Staging
Attack
Back-up
Vent
Water
RIT Recon
RIT Search
RIT Rescue
RIT Removal
RIT Support

Checklist to evaluate the IC

During Fireground Operations:

- □ RIT Ready
- □ Briefing with RIT Officer
- □ Verified resources are in staging
- □ Command team in place
- □ Recognition of the risk vs. gain
- □ Verified location of crews operating
- □ Established secondary water supply
- □ Checked the other radio channel
- □ Ensured EMS was on-scene
- □ Checked times with Dispatch's elapsed time notifications
- □ Created or verified an Incident Safety Officer was in place

During the "Mayday" Event:

- □ Confirm receipt of Mayday
- □ Clear radio traffic and switch fireground crews
- □ Deployed RIT Recon
- □ Withdrew non-essentials
- □ Maintained suppression forces
- □ Verified PAR
- □ Ensured ventilation was coordinated
- □ Assigned accountability officer
- □ Ensured RIT was reporting location through the rope system
- □ Create RIT Branch
- □ Re-evaluated the IAP
- □ Created an Operation, plans, and logistics section
- □ Created a PIO and Liaison
- □ Recognized the benchmarks of the RIT operation
- □ Monitored and tracked the time and location

Checklist for the Support Chief

Data Collected by : _____ *Date:* _____

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
Location of Exercise						
# of FF's total						
# of IC's who created a Rescue Branch						
Did the IC's expand the ICS to include Operations Section & Planning Section						
Did the IC's functionally name RIT as they were deployed						
# of times the IC could not account for personnel						
Number of RIT's deployed						
Did RIT report location?						
# of Maydays called out by RIT members						
# of times members did not respond to command radio traffic						
# of times Command committed another RIT team for RIT						
How many FF's would not have made it out						
Time to locate the FF						
Downed FF on air						
RIT Rescue In						
RIT Rescue at FF						
RIT Search out						
Started Removal						
Downed FF Out						